L8(4.5) Factoring Special Quadratics (Perfect Square Trinomials & Differences of 2 Squares)

1. Perfect Square Trinomial

(a) $a^2 + 2ab + b^2 = (a + b)(a + b)$

$= (a + b)^2$

(b) $a^2 - 2ab + b^2 = (a - b)(a - b)$

$= (a - b)^2$

Remember

1
4
9
16
25
36
49
64
81
100
121
144

Note:

I. Standard methods, such as **alge-tiles** or **decomposition (SPI or MAN)** will also work, but may take longer.

II. It is critical to check the **2ab** term to make sure you have a perfect square, or verify your final answer by expanding.

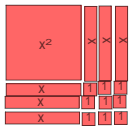
Ex.1 Factor using a pattern (if possible)

(a) $x^2 + 6x + 9$

$= (x+3)(x+3)$

$= (x+3)^2$

M: 9
A: 6
N: 3, 3



(b) $4x^2 - 12x + 9$

$= (2x-3)(2x-3)$

$= (2x-3)^2$

M: 36
A: −12
N: −6, −6

(c) $25x^2 - 30x + 9$

$(5x-3)(5x-3)$

M: 225
A: −30
N: −15, −15

Ex.1 Factor using a pattern (if possible)

(a) $x^2 + 12x + 36$

$= (x+6)(x+6)$

$= (x+6)^2$

(b) $x^2 + 13x + 36$

$= x^2 + 4x + 9x + 36$

$= x(x+4) + 9(x+4)$

$= (x+9)(x+4)$

M: 36
A: 13
N:

36
1×36
2×18
3×12
4×9

(c) $4x^2 - 20x + 25$

$= (2x-5)^2$

2. Difference of Squares

$a^2 - b^2 = (a + b)(a - b)$

$= (a - b)(a + b)$

(the order of the binomials does not matter)

Examples:

M −36
A 0
N −6, 6

(a) $4x^2 - 9$

$= (2x-3)(2x+3)$

$= 4x^2 + 6x - 6x - 9$

0

(b) $9x^2 - 16$

$= (3x-4)(3x+4)$

Ex.2 Factor

(a) $k^2 - 121$

$= (k-11)(k+11)$

(b) $81m^2 - 144$

$= (9m+12)(9m-12)$

$= 3(3m+4) \times 3(3m-4)$

$= 9(3m+4)(3m-4)$

Ex.3 Factor using a special pattern:

(a) $25d^2 - 144$

$= (5d-12)(5d+12)$

(b) $16x^2 + 24xy + 9y^2$

$= (4x+3y)(4x+3y)$

$= (4x+3y)^2$

(c) $18p^2q - 60pq + 50q$

$= 2q(9p^2 - 30p + 25)$

$= 2q(3p-5)(3p-5)$

$= 2q(3p-5)^2$

(d) $98a^2 - 32b^2$

$= 2(49a^2 - 16b^2)$

$= 2(7a+4b)(7a-4b)$

$4a^2 \ominus 16$

Must be negative for Difference of squares

Ex.4: Factor $x^2 - 10x + 25 - w^2$

$= (x-5)(x-5) - w^2$

$= (x-5)^2 - w^2$ let $a = (x-5)$

$= a^2 - w^2$

$= (a-w)(a+w)$

$= (x-5-w)(x-5+w)$

Assigned Work:

p. 230-231 # 3bc, 5, 6, 7, 10, 11, 14